

**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. NM195; Special Conditions No. 25-192-SC]**

**Special Conditions:** Boeing Model 777-200 Series Airplanes; Overhead Crew Rest  
Compartments

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for Boeing Model 777-200 series airplanes, modified by the Boeing Commercial Airplane Group, Wichita. The proposed modification consists of the installation of an overhead flightcrew rest (OFRCR) and an overhead attendant rest (OAR). The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**EFFECTIVE DATE:** November 6, 2001.

**FOR FURTHER INFORMATION CONTACT:** Jayson Claar, FAA, Airframe/Cabin Safety Branch, ANM-115, Transport Standards Staff, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98055-4056; telephone (425) 227-2194; facsimile (425) 227-1320.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On September 18, 2000, the Boeing Commercial Airplane Group (BCAG) – Wichita Division Designated Alteration Station (DAS) applied for a Supplemental Type Certificate (STC) from the Wichita Aircraft Certification Office (ACO). The STC is to install an overhead flightcrew rest (OFCR) and an overhead attendant rest (OAR) on Boeing Model 777-200 series airplanes. The OFCR compartment adjacent to door one will include a maximum of two private berths and two seats. Occupancy of the OFCR will be limited to a maximum of four occupants. The OAR compartment, adjacent to door three, will include a combination of private berths and seats for a maximum of twelve occupants. Occupancy of the OAR will be limited to a maximum of twelve occupants. Follow-on designs may locate the OAR at either door three, or door four depending on the Model 777-200 airplane and option(s) selected by the customer.

Both crew rests, OFCR and OAR, will be accessed from the main deck by stairs. In addition, an emergency hatch which opens directly into the cabin area will be provided for each compartment. A smoke detection system, an oxygen system, and occupant amenities will also be provided. These compartments will only be occupied in flight, not during taxi, takeoff, or landing.

The Boeing Model 777-200 series airplanes are large twin engine airplanes with various passenger capacities and ranges depending upon airplane configuration, and currently do not incorporate OFCR and OAR compartments in production. While the installation of a crew rest compartment is not a new concept for large transport category airplanes, each crew rest compartment has unique features based on design, location, and use on the airplane. Crew rest

compartments have been installed and certified in the main passenger area, above the main passenger area and below the passenger cabin area within the cargo compartment of the Boeing Model 777-200/-300 series airplanes. Also, overhead crew rest compartments have been installed on the Boeing Model 747 series airplanes.

The FAA has previously issued special conditions, which contain the additional safety standards that must be met for the overhead crew rests on Boeing Model 747 series airplanes. The FAA certified the lower lobe attendant rest on the Boeing Model 777-200 series airplanes by equivalent level of safety finding to the requirements of § 25.819. In addition, the FAA issued Special Conditions No. 25-169-SC, dated December 1, 2000, for 777-200 series airplanes for overhead crew rest to support a STC for Flight Structures Inc (FSI) of Arlington, Washington. The Flight Structures, Inc. (FSI) Special Conditions No. 25-169-SC were amended on May 2, 2001.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards. Certification requirements for pilot “sleeping quarters” per the requirements of § 121.485 are not addressed in these special conditions. The applicant must work directly with the Aircraft Evaluation Group (AEG) with regard to the adequacy of onboard sleeping quarters/facilities for compliance with §§ 121.485(a), 121.523(b) and 135.269(b)(5). The AEG is responsible for making this finding.

### **Type Certification Basis**

Under the provisions of § 21.101, Boeing must show that the Model 777-200 series airplanes, as changed, continue to meet the applicable provisions of the regulations incorporated

by reference in Type Certificate No. T00001SE or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the "original type certification basis." The regulations incorporated by reference in Type Certificate No. T00001SE for the Boeing Model 777-200 series airplanes include 14 CFR part 25, as amended by Amendments 25-1 through 25-82. The U.S. type certification basis for the Boeing Model 777-200 series airplanes is established in accordance with 14 CFR §§ 21.17 and 21.29 and the type certification application date. The type certification basis is listed in Type Certificate Data Sheet No. T00001SE.

If the Administrator finds that the applicable airworthiness regulations (i.e., part 25) do not contain adequate or appropriate safety standards for the Boeing Model 777-200 airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Boeing Model 777-200 series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36.

Special conditions, as appropriate, are issued in accordance with § 11.19, after public notice, as required by § 11.38, and become part of the type certification basis in accordance with § 21.101(b)(2).

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model under the provisions of § 21.101(a)(1).

## **Novel or Unusual Design Features**

While the installation of a crew rest compartment is not a new concept for large transport category airplanes, each compartment design has unique features by virtue of its design, location, and use on the airplane. Previously, crew rest compartments have been evaluated that are installed within the main passenger compartment area of the Boeing Model 777-200 and Model 777-300 series airplanes and the overhead area of the passenger compartment of the 777-200. Other crew rest compartments have been installed below the passenger cabin area, adjacent to the cargo compartment. Similar overhead crew rest compartments have also been installed on the Boeing Model 747 airplane. The interfaces of the modification are evaluated within the interior and assessed in accordance with the certification basis of the airplane. However, part 25 does not provide all the requirements for crew rest compartments within the overhead area of the passenger compartment. Further, these special conditions do not negate the need to address other applicable part 25 regulations.

Due to the novel or unusual features associated with the installation of this crew rest compartment, special conditions are considered necessary to provide a level of safety equal to that established by the airworthiness regulations incorporated by reference in the type certificate.

## **Discussion of Comments**

Notice of Proposed Special Conditions No. 25-01-04-SC for the Boeing Model 777-200 series airplanes, was published in the Federal Register on September 24, 2001 (66 FR 48836). Two commenters responded to the notice. One commenter finds the proposed special conditions to be satisfactory. The other commenter disagrees with aspects of the requirements of four of the

proposed special conditions, however, no justification for the disagreement is provided.

Therefore, the special conditions are issued as proposed.

### **Applicability**

As discussed above, these special conditions are applicable to Boeing Model 777-200 series airplanes. Should Boeing Commercial Airplane Group, Wichita Division Designated Alternation Station, apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. T00001SE to incorporate the same novel or unusual design feature, the special conditions would apply to that model as well under the provisions of § 21.101(a)(1).

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the Federal Register; however, as the certification date for the Boeing Model 777-200 series airplanes is imminent, the FAA finds that good cause exists to make these special conditions effective upon issuance.

### **Conclusion**

This action affects only certain novel or unusual design features on Boeing Model 777-200 series airplanes. It is not a rule of general applicability, and it affects only the applicant who applied to the FAA for approval of these features on the airplane.

### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Boeing Model 777-200 series airplanes, as modified by Boeing Commercial Airplane Group, Wichita Division Designated Alteration Station, with overhead crew rest compartments, OFCR and/or OAR compartments.

1. Occupancy of the overhead crew rest compartment is limited to the total number of installed bunks and seats in each compartment. There must be an approved seat or berth able to withstand the maximum flight loads when occupied for each occupant permitted in the crew rest compartment. The maximum occupancy is four in the OFCR and 12 for the OAR.

(a) There must be appropriate placards, inside and outside to indicate:

(1) The maximum number of occupants allowed,

(2) That occupancy is restricted to crewmembers that are trained in the evacuation procedures for the overhead crew rest compartment,

(3) That occupancy is prohibited during taxi, take-off and landing, and

(4) That smoking is prohibited in the crew rest compartment.

(5) That hazardous quantities of flammable fluids, explosives, or other dangerous cargo are prohibited from the crew rest compartment.

(b) There must be at least one ashtray on the inside and outside of any entrance to the crew rest compartment.

(c) There must be a means to prevent passengers from entering the compartment in the event of an emergency or when no flight attendant is present.

(d) There must be a means for any door installed between the crew rest compartment and passenger cabin to be capable of being quickly opened from inside the compartment, even when crowding occurs at each side of the door.

(e) For all doors installed, there must be a means to preclude anyone from being trapped inside the compartment. If a locking mechanism is installed, it must be capable of being unlocked from the outside without the aid of special tools. The lock must not prevent opening from the inside of the compartment at any time.

2. There must be at least two emergency evacuation routes, which could be used by each occupant of the crew rest compartment to rapidly evacuate to the main cabin. In addition -

(a) The routes must be located with sufficient separation within the compartment, and between the evacuation routes, to minimize the possibility of an event rendering both routes inoperative.

(b) The routes must be designed to minimize the possibility of blockage, which might result from fire, mechanical or structural failure, or persons standing below or against the escape route. One of two evacuation routes should not be located where, during times in which occupancy is allowed, normal movement by passengers occurs (i.e. main aisle, cross aisle or galley complex) that would impede egress of the crew rest compartment. If an evacuation route utilizes an area where normal movement of passengers occurs, it must be demonstrated that passengers would not impede egress to the main deck. If there is low headroom at or near the evacuation route, provisions must be made to prevent or to protect occupants (of the crew rest area) from head injury. The use of evacuation routes must not be dependent on any powered device. If the evacuation path is over an area where there are passenger seats, a maximum of one

row of passengers may be displaced from their seats temporarily during the evacuation process. If the evacuation procedure involves the evacuee stepping on seats, the seats must not be damaged to the extent that they would not be acceptable for occupancy during an emergency landing.

(c) Emergency evacuation procedures and the emergency evacuation of incapacitated occupant procedures must be established and transmitted to the operator for incorporation into their training programs and appropriate operational manuals. If the evacuation path is over an area where there are passenger seats, a maximum of one row of passengers may be displaced from their seats temporarily during the evacuation process.

(d) There must be a limitation in the Airplane Flight Manual or other suitable means requiring that crewmembers be trained in the use of evacuation routes.

3. There must be a means for the evacuation of an incapacitated person (representative of a ninety-fifth percentile male) from the crew rest compartment to the passenger cabin floor.

(a) The evacuation must be demonstrated for all evacuation routes. A flight attendant or other crewmember (a total of one assistant within the crew rest area) may provide assistance in the evacuation. Additional assistance may be provided by up to three persons in the main passenger compartment. These additional assistants must be standing on the floor while providing assistance, except that for evacuation routes having stairways, the additional assistants may ascend up to one half the elevation change from the main deck to the overhead compartment, or to the first landing, whichever is lower.

(b) Procedures for the evacuation of an incapacitated person from the crew rest compartment must be established.

4. The following signs and placards must be provided in the crew rest compartment:

(a) At least one exit sign, located near each exit, meeting the requirements of § 25.812(b)(1)(i), except that a sign of reduced background area with no less than 5.3 square inches (excluding the letters) may be utilized, provided that it is installed such that the material surrounding the exit sign is light in color (e.g. white, cream, light beige). If the material surrounding the exit sign is not light in color, a sign with a minimum of a one inch wide background border around the letters would also be acceptable.

(b) An appropriate placard defining the location and the operating instructions for each evacuation route.

(c) Placards must be readable from a distance of 30 inches under emergency lighting conditions.

(d) The exit handles and evacuation path operating instruction placards must be illuminated to at least 160 microlamberts under emergency lighting conditions.

5. There must be a means in the event of failure of the airplane's main power system, or of the normal crew rest compartment lighting system, for emergency illumination to be automatically provided for the crew rest compartment.

(a) This emergency illumination must be independent of the main lighting system.

(b) The sources of general cabin illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency lighting system is independent of the power supply to the main lighting system.

(c) The illumination level must be sufficient for the occupants of the crew rest compartment to locate and transfer to the main passenger cabin floor by means of each evacuation route.

6. There must be means for two-way voice communications between the crewmembers on the flight deck and the occupants of the crew rest compartment. There must also be two-way communications between the occupants of the crew rest compartment and each flight attendant station required to have a public address system microphone per § 25.1423(g) in the passenger cabin.

7. There must be a means for manual activation of an aural emergency alarm system, audible during normal and emergency conditions, to enable crewmembers on the flight deck and at each pair of required floor level emergency exits to alert occupants of the crew rest compartment of an emergency situation. Use of a public address or crew interphone system would be acceptable, providing an adequate means of differentiating between normal and emergency communications is incorporated. The system must be powered in flight, after the shutdown or failure of all engines and auxiliary power units, or the disconnection or failure of all power sources dependent on their continued operation, for a period of at least ten minutes.

8. There must be a means, readily detectable by seated or standing occupants of the crew rest compartment, which indicates when seat belts should be fastened. In the event there are no seats, at least one means must be provided to cover anticipated turbulence. Seat belt type restraints must be provided for berths and must be compatible for the sleeping attitude during cruise conditions. There must be a placard on each berth requiring that seat belts must be fastened when occupied. If compliance with any of the other requirements of these special

conditions is predicated on specific head location, there must be a placard identifying the head position.

9. The following equipment must be provided in the crew rest compartment:

(a) At least one approved hand-held fire extinguisher appropriate for the kinds of fires likely to occur;

(b) One protective breathing equipment device approved to Technical Standard Order (TSO)-C116 or equivalent, suitable for fire fighting; and

(c) One flashlight.

10. A smoke detection system (or systems) must be provided that monitors each area within the crew rest including those areas partitioned by curtains. Flight tests must be conducted to show compliance with this requirement. Each system (or systems) must provide:

(a) A visual indication to the flight deck within one minute after the start of a fire;

(b) An aural warning in the crew rest compartment; and

(c) A warning in the main passenger cabin. This warning must be readily detectable by a flight attendant, taking into consideration the positioning of flight attendants throughout the main passenger compartment during various phases of flight.

11. The crew rest compartment must be designed such that fires within the compartment can be controlled without a crewmember having to enter the compartment, or the design of the access provisions must allow crewmembers equipped for firefighting to have unrestricted access to the compartment. The time for a crewmember on the main deck to react to the fire alarm, to don the fire fighting equipment, and to gain access must not exceed the time for the compartment to become smoke-filled, making it difficult to locate the fire source.

12. There must be a means provided to exclude hazardous quantities of smoke or extinguishing agent originating in the crew rest compartment from entering any other compartment occupied by crewmembers or passengers. The means must include the time periods during the evacuation of the crew rest compartment and, if applicable, when accessing the crew rest compartment to manually fight a fire. Smoke entering any other compartment occupied by crewmembers or passengers must dissipate within five minutes after closing the access to the crew rest compartment. Flight tests must be conducted to show compliance with this requirement.

If a built-in fire extinguishing system is used in lieu of manual fire fighting, then the fire extinguishing system must be designed so that no hazardous quantities of extinguishing agent will enter other compartments occupied by passengers or crew; the system must have adequate capacity to suppress any fire occurring in the crew rest compartment, considering the fire threat, volume of the compartment and the ventilation rate.

13. There must be a supplemental oxygen system equivalent to that provided for main deck passengers for each seat and berth in the crew rest compartment. The system must provide an aural and visual warning to warn the occupants of the crew rest compartment to don oxygen masks in the event of decompression. The warning must activate before the cabin pressure altitude exceeds 15,000 feet. The aural warning must sound continuously until a reset push button in the crew rest compartment is depressed.

14. The following requirements apply to a crew rest compartment that is divided into several sections by the installation of curtains or partitions:

(a) To compensate for sleeping occupants, there must be an aural alert that can be heard in each section of the crew rest compartment that accompanies automatic presentation of supplemental oxygen masks. A minimum of two supplemental oxygen masks are required in each section whether or not seats or berths are installed in each section. There must also be a means by which the oxygen masks can be manually deployed from the flight deck.

(b) A placard is required adjacent to each curtain that visually divides or separates, for privacy purposes, the overhead crew rest compartment into small sections. The placard must require that the curtain(s) remain open when the private section it creates is unoccupied. The vestibule section adjacent to the stairway is not considered a private area and, therefore, does not require a placard.

(c) For each crew rest section created by the installation of a curtain, the following requirements of these special conditions must be met with the curtain open or closed:

- (1) No smoking placard (Special Condition No. 1),
- (2) Emergency illumination (Special Condition No. 5),
- (3) Emergency alarm system (Special Condition No. 7),
- (4) Seat belt fasten signal (Special Condition No. 8), and
- (5) The smoke or fire detection system (Special Condition No. 10).

(d) Overhead crew rest compartments visually divided to the extent that evacuation could be affected must have exit signs that direct occupants to the primary stairway exit. The exit signs must be provided in each separate section of the crew rest compartment, and must meet the requirements of § 25.812(b)(1)(i).

(e) Sections within an overhead crew rest compartment that are created by the installation of a rigid partition with a door physically separating the sections, the following requirements of these special conditions must be met with the door open or closed:

(1) There must be a secondary evacuation route from each section to the main deck, or alternatively, it must be shown that any door between the sections has been designed to preclude anyone from being trapped inside the compartment.

(2) Any door between the sections must be shown to be openable when crowded against, even when crowding occurs at each side of the door.

(3) There may be no more than one door between any seat or berth and the primary stairway exit.

(4) There must be exit signs in each section meeting the requirements of § 25.812(b)(1)(i) that direct occupants to the primary stairway exit. An exit sign with reduced background area as described in Special Condition No. 4(a) may be used to meet this requirement.

(f) For each smaller section within the main crew rest compartment created by the installation of a partition with a door, the following requirements of these special conditions must be met with the door open or closed:

- (1) No smoking placards (Special Condition No. 1),
- (2) Emergency illumination (Special Condition No. 5),
- (3) Two-way voice communication (Special Condition No. 6),
- (4) Emergency alarm system (Special Condition No. 7),
- (5) Seat belt fasten signal (Special Condition No. 8),

- (6) Emergency fire fighting and protective equipment (Special Condition No. 9), and
- (7) Smoke or fire detection system (Special Condition No. 10).

15. The requirements of two-way voice communication with the flight deck and provisions for emergency firefighting and protective equipment are not applicable to lavatories or other small areas that are not intended to be occupied for extended periods of time.

16. Where a waste disposal receptacle is fitted, it must be equipped with an automatic fire extinguisher that meets the performance requirements of § 25.854(b).

17. Materials (including finishes or decorative surfaces applied to the materials) must comply with the flammability requirements of § 25.853(a), as amended by Amendment 25-83. Mattresses must comply with the flammability requirements of § 25.853(c), as amended by Amendment 25-83.

Issued in Renton, Washington on November 6, 2001.

/s/

Jeff Duven  
Acting Manager, Transport Airplane Directorate  
Aircraft Certification Service, ANM-100